

THE EFFECT OF A QUESTIONING TRAINING APP TO TEACH SPANISH QUESTIONS
TO MOTHERS OF DUAL LANGUAGE LEARNERS AT RISK OF DEVELOPMENTAL
LANGUAGE DISORDER

by

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LANGUAGE DISORDER

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Abstract

This study will analyze data from a previous study that investigated the use of a parent training to promote vocabulary in DLLs at risk of DLD. The previous study collected data from six Spanish-speaking caregivers (mothers) from a bilingual (Spanish and English) early intervention program for children with DLD from northern Texas. Mothers had one child (3 and 5 years old) and did not participate before in a language training. Children were identified by the school therapists of being at risk of DLD since they were presenting with a language delay based on their initial language evaluation. For confidentiality all participants received a code (P1, P2, P3, P4, P5, and P6). The purpose of this research is to examine the functional relation between an app-based parent training and parent's use of the "questioning" strategy during shared book reading with children at risk of DLD.

Table of Contents

List of Figures.....	v
List of Diagrams.....	vi
Chapter I: Literature Review.....	1
Introduction.....	1
Language Development and Vocabulary.....	2
Computer Training for Parents.....	3
Chapter II: Methods.....	5
Participants and Recruitment	5
Experimental Design and Procedures.....	5
Probes.....	6
Caregiver Trainings.....	6
Training Strategies.....	7
Coding Procedure and Procedural Fidelity.....	8
Data Analysis.....	8
Chapter III: Results.....	9
Visual Analysis.....	9
Baseline-corrected Tau effect size estimate.....	10
Maintenance.....	11
Chapter IV: Discussion.....	12
Results.....	12
Limitation of the Study and Future Research.....	13
Clinical Implications and Conclusions.....	13

References.....15

List of Tables

Table 1. Baseline-corrected Tau Effect Size Estimate.....17

List of Figures

Figure 1.	Participant 1 Results.....	18
Figure 2.	Participant 2 Results.....	19
Figure 3.	Participant 3 Results.....	20
Figure 4.	Participant 4 Results.....	21
Figure 5.	Participant 5 Results.....	22
Figure 6.	Participant 6 Results.....	23

Chapter 1

Literature Review

Introduction

Spanish is an essential language for communication within the Hispanic Latino/x families and general community in the United States (US). Children who are learning a second language (L2, English) while continuing to develop their first language (L1, Spanish) are known as Dual Language Learners (DLL; Proctor, et al., 2005). Spoken language abilities in both languages (Spanish and English) are important for DLL's academic development (Hammer et al., 2011). In early stages of children development, vocabulary is essential as it is correlated to language and literacy skills and consequently impacts a child's achievement in school (Duff et al., 2015). Research suggests that school age children's vocabulary in early stages is related to the development of decoding of words when reading (e.g., Nation & Cocksey, 2009). Vocabulary is also important for reading comprehension (e.g., Duff et al., 2015). Thus, when children present lower growth in academic vocabulary knowledge they may present difficulties with reading comprehension and academic performance in school (Proctor et al., 2006). Children who show difficulties with language disorders not associated with any biomedical condition can be diagnosed with Developmental Language Disorder (DLD). Children with DLD may present difficulty in expressing themselves with vocabulary, grammar, and written/spoken language. Few studies have investigated the impact of parental training in Spanish questioning as a strategy to promote Spanish vocabulary in their children (e.g., Fritjers et al., 2019, Ramirez et al., 2015; Wathen & Lugo-Neris, 2019). There have been even fewer studies investigating whether parental training promotes diverse questioning strategies in at-risk dual language learners (DLLs) with developmental language disorders (DLD) within the Latino/x population in the United

States. There are even less studies that have investigated if parental training promotes a diverse use of questions in DLLs at risk of DLD in the Latino/x population in United States. The purpose of this research is to examine the functional relation between an app-based parent training and parent's use of the "questioning" strategy during shared book reading with children at risk of DLD.

Language Development and Vocabulary

Children who develop large vocabularies in preschool at a very young age tend to have better language, reading, and cognitive outcomes than children with small vocabularies (Marchman & Fernald 2008). Parental training with children has proven to be beneficial for both the parent learning of strategies and children language improvement. Parent training intervention has a significant, positive impact on receptive and expressive language skills of children (Roberts & Kaiser, 2011). Learning to communicate depends greatly on interaction. Thus, a child's communicative parents influence his or her vocabulary development immensely; especially in the earlier stages of development (Sameroff & Fiese, 2000).

Early language and vocabulary intervention programs were created to support children who are at risk of having low vocabulary and their overall language skills. Early intervention programs can help to address language gaps in children at risk of language delays and language disorders (Fernald et al., 2013). Children at risk of having a low vocabulary include children who are exposed to limited opportunities for language input, children who have been identified as having a language disorders, developmental delays, and hearing impairment (Leonard, 2014). DLLs who have been diagnosed with DLD are at risk of having difficulties in their vocabulary acquisition in both languages.

Many language facilitation strategies have been suggested to clinicians, parents, and teachers to improve language learning in children (Fickenscher & Gaffney). For example, shared book reading. Shared book reading is when an adult interactively reads a book to a child or to a group of children. The adult models to the child fluency, expression, and flow of reading. This shared experience is important for children to begin to understand that reading books is fun and that books can tell a story. Furthermore, adults can increase their shared learning experience with their children audience by using dialogic reading strategies. Dialogic reading strategies are a style of reading to children that promotes their literacy and language skills (Whitehurst, 1994; Whitehurst & Lonigan, 1998). Dialogic reading helps to enhance the children's knowledge by using completion, questioning, and distancing techniques. These strategies help to apply the storybook to the children's personal lives and to make the story come alive.

Computer Training for Parents

Several studies have examined the effects of teaching caregivers of children with primary and secondary language impairments to use specific language support strategies. Parent trainings have a positive effect in child language outcomes (Robert & Kaser, 2011). For example, videos modeling dialogic reading strategies have been used to promote language in children that speak English (Zevenbergen & Whitehurst, 2003). Other studies of caregiver-implemented interventions have found positive results. In a study of a 13-week caregiver-implemented intervention (e.g., The Heidelberg Parent-Based Language Intervention), Buschmann and colleagues (2009) found significant and positive results for children with expressive language impairment. Caregivers were taught how to maximize interactions with their children to promote language development. Computer training for parents is convenient, accessible, and the most effective way to teach parents.

Additionally, a recent study has examined the efficacy of online learning modules for teaching dialogic reading and phonemic awareness skills. In this research, participants were assigned online learning modules that taught them dialogic reading and phonemic awareness skills and strategies. The results indicated an increase in scores from the dialogic reading module. These results suggest that the module training was effective in improving the knowledge of these strategies for adults (Krimm and Lund, 2021.)

Rivera Perez and colleagues (2022) developed a computer-based parent training to teach parents to use vocabulary strategies (Completion, Distancing, and Questioning) in Spanish to promote Spanish language and literacy to DLLs at risk of DLD. The computer training was based on the adult instructional strategy Teach, Model, Coach, Review (Khan & Kim, 2012). This computer application allows SLPs and instructors that do not speak Spanish to support vocabulary in children at risk of DLD. Parent in this research demonstrated less robust (moderate, when compared to Completion, and Distancing) effect on learning of the strategy “questioning” as a whole. The authors hypothesized that the type of question (What, Who, When, Where, and Why) may play an important role as Latinx mothers have reported the use of requesting word (e.g., what is this?) as a common practice (Cycyk & Hammer, 2020). The authors also indicate that participants initially used basic "what" questions, but after receiving training, they started asking more complex questions like "why," "who," "how," or "when." This indicates that the training program had a positive effect on their questioning behavior and improved their questioning skills. Further analysis of the specific types of questions learned would be beneficial for gaining a deeper understanding of the impact of the training program on the participants' questioning abilities. The purpose of this study examine if there is a functional relation between the use of the Spanish parent training app and parent use of Spanish questioning

strategies (Qué [What], Quién [Who], Cuándo [When], Dónde [Where], Porqué [Why]) by caregivers during shared book reading with their children at risk of DLD.

1. Is there a functional relation between the use of the Spanish parent training app and parent use of questioning strategies (Qué [What], Quién [Who], Cuándo [When], Dónde [Where], Por qué [Why]) by caregivers during shared book reading with their children at risk of DLD?
2. Do caregivers use more often one type of question?
3. Do caregivers maintain the use of these strategies post-intervention?

Chapter II

Methods

Participants and Recruitment

This study analyzed data from a previous study that investigated the use of a parent training to promote vocabulary in DLLs at risk of DLD. The previous study collected data from six Spanish-speaking caregivers (mothers) from a bilingual (Spanish and English) early intervention program for children with DLD from northern Texas. Mothers had one child (between 3 and 5 years old) and did not participate before in a language training. Children were identified by the school therapists of being at risk of DLD since they were presenting with a language delay based on their initial language evaluation. For confidentiality all participants received a code (P1, P2, P3, P4, P5, and P6).

Experimental Design and Procedures

A multiple baseline single-case design across behaviors will be used to measure the functional relation between the independent (training) and dependent (questioning strategy) variable (Horner & Baer, 1978). For baseline data, Mothers were asked to read as they usually

do with their children. For the intervention stage, parents received training for three reading strategies (Distancing, Completion, and Questioning). This research will only analyze the use of specific questions during Questioning strategy.

Probes

Baseline data points that assessed parent behavior were collected during the week before the training started and then continued to be assessed throughout and well after the intervention. Once the training started, all mothers were instructed to read the designated study books to their children three times per week during probe assessments, using the same books provided to them (Bertrand et al., 1996). Before the training began, baseline data points were gathered to assess parent behavior, and these assessments were continued throughout and after the intervention. All mothers were provided with the same set of books and were instructed to read them to their children three times a week after the training started. The reading sessions were audio recorded, and each session was evaluated for the use of dialogic reading strategies by the parents. The first reading session occurred at the intervention site, while the remaining three took place at home. Participants were given a fully charged voice recorder, Spanish instructions on how to use it, the assigned storybook of the week, and a bookmark summarizing the most recently assigned reading strategy to use during reading. The chosen children's books were appropriate for bilingual preschool-aged children.

Caregiver Training

Using the Teach-Model-Coach-Review approach derived from Participatory Adult Learning Strategies (Dunst & Trivette, 2009; Peredo et al., 2018; Roberts, et al., 2014), an app was developed that can be accessed on any electronic device. Previous studies have reported positive outcomes from training programs utilizing the same framework for both parents and

professionals using electronic devices (e.g., Krimm & Lund, 2021; Sukonthaman, 2021). The instructions provided in the app were narrated by two native Spanish speakers.

Training Strategies

This occurred in the conference room of a school where adult chairs were provided for the parents. The training program was administered on an iPad Pro (12.9-inch, 2nd Generation) and noise cancellation headphones (Sennheiser HD280PRO). The iPad training application targeted three different training strategies for the parents to familiarize themselves with: *Conectar* (Distancing), *Completar* (Completion), *Preguntar* (Open-Ended Questions/Wh-questions).

Preguntas Interrogativas, means the Questioning strategy. This is considered an open-ended question that cannot be answered with only a “yes” or no” response. The wh-questions such as, “Why did the dog feel sad?” or “How do you think the dog is feeling?” Spanish keywords for identifying the *Preguntar* strategy were *quién* [who], *qué* [what], *cuál* [which], *cuándo* [when], *dónde* [where], and *por qué* [why].).

After the baseline information was gathered, the participants started their training on one of the three reading strategies with an iPad. All instructions for the training were given to the participants in Spanish.

Each participant was trained on their assigned reading strategy from the app in-person once a week for two consecutive weeks of the total training timeline. After the training was complete, the participant got a new book to take home and a bookmark with a description of the reading strategy they were just trained on. This bookmark was a good reminder of the training they went through for when the participants went home to read. This process continued until the completion of the 6-week training period.

Coding Procedure and Procedural Fidelity

All reading sessions held in-person and at-home were transcribed. Sessions will be coded for the use of each questioning strategy (quién [who], qué [what], cuál [which], cuándo [when], dónde [where], and por qué [why]). The coders for this study will be speakers and writers of Spanish and graduate students in Speech-Language Pathology at Texas Christian University with a focus on bilingual populations. All coders will be trained and will practice coding with audio files prior to coding. All coders achieved at least 90% coding reliability with the authors. Twenty percent of all participants' recorded sessions will be double scored using the coding manual created to code questions (quién [who], qué [what], cuál [which], cuándo [when], dónde [where], por qué [why]). The reliability of coding agreement will be obtained.

Procedural fidelity of 100% was obtained by observations of half of the in-person sessions by one of the members of the research team, who completed the procedural fidelity checklist by watching a live session of the graduate student.

Data Analysis

A multiple, baseline single-case design was used in this research to measure a functional relationship between an independent variable of an app-based parental training program and the dependent variable of the mothers' use of the strategies taught in the app (Horner & Baer, 1978). Changes in use of strategies will be examined using visual analysis of the data. This model has been used in similar research for training adults to use language strategies (e.g., Lund & Douglas, 2016; Rivera Perez, 2022). To supplement our visual analysis, we use non-parametric statistical analyses (Baseline-corrected Tau) to find effect size estimates using an online calculator for Pustejovsky et al., 2022.

Chapter III

Results

Visual Analysis

To answer our first research question (Is there a functional relation between the use of the Spanish parent training app and parent use of questioning strategies (What, Who, When, Where, Why) by caregivers during shared book reading with their children at risk of DLD?), our visual analysis suggests a functional relationship between the training and questions strategy when compared to the baseline particularly for Participant 3 (See figure 3). When analyzing the graph for Participant 3, it is obvious that the variety and number of questions used by this participant increased significantly in training and maintenance. During Baseline, the parent asked a few “Qué” and one “Quién” question. However, during training and maintenance, the parent asks every question at least twice. This is a meaningful increase which suggests a correlation and functional relationship between the training app and use of questioning strategies.

To answer our second question (Do caregivers used more used more often one type of question?) a visual analysis indicates the following: Participant 1, during baseline the “Qué” question was used consistently throughout with slight usage of “Dónde.” When training started, the data shows increased use of “Qué,” “Quién,” and “Dónde.” However, “Cuándo” and “Por qué” questioning strategies were never used for Participant 1. For Participant 2, the use of “Qué” and “Dónde” was increased during training compared to during baseline. Additionally, there was very little use of “Cuándo,” “Por qué,” and “Quién.” When looking at the graph from Participant 3, the participant uses some “Qué” and “Quién” questions during baseline and then increases in all strategies during training and maintenance. However, in comparison to the rest of the questioning strategies, the “Cuándo” and “Por qué” questions are used less often by this

Participant. Next, when analyzing Participant 4, we can see “Qué” is used most consistently in baseline. Then, during training, “Quién” is used the most with some “Por qué,” “Qué,” and “Cuándo” occasionally being used. For Participant 5, the data displays that during baseline the participant used “Qué” and “Dónde” questions only. In the baseline and maintenance stages, this participant started to include “Quién” questions along with the previous ones used. It is notable that throughout this entire process the participant never used “Cuándo” or “Por qué.” Finally, when looking at Participant 6, it shows that there is no use of any questions during baseline. Then, in training, the participant begins to use more of the questions except for “Cuándo.” In the maintenance stage, there is a decrease in overall usage of questions. Furthermore, “Cuándo” is never used in this stage again.

Baseline-corrected Tau Effect Size Estimate

To supplement our visual analysis, we use a non-parametric statistical analyses of size effect called “Baseline-corrected Tau effect size estimate” using an online calculator (e.g., Pustejovsky et al., 2022). For interpretation of these results, we will be using Vannest and Ninci (2015) effect size. A small value is considered $> .20$, moderate $.20-.60$, large $0.60-0.80$, and very large $> .80$ effects. Table# 1 contained the baseline-corrected Tau effect size. Based on these outcomes a small value is considered $> .20$, moderate $.20-.60$, large $0.60-0.80$, and very large $> .80$ effects. Here we talk about what type of questions they have a very large, large or moderate effect (See the table).

Most participants (P1, P2, P5) demonstrated a large relationship for Qué questions at $p > .05$. Participant 5 and 6 demonstrated a very large relationship for Qué questions with a 1.00 and .82 effect size, respectively. In regard to the Quién question, P1, P5, and P6 scored within a large range with P2 scoring moderately. Additionally, for the Dónde questions, Participant 1, 3, and 5

demonstrated a large relationship, Participant 2 demonstrated a small relationship, Participant 4 and 6 demonstrated a moderate relationship. The majority of participants (P1, P4, P5, P6) demonstrated a small relationship. Three of the four of these participants scored at 0.00. Participants 2 and 3 displayed moderate relationships. Finally, with Por Qué questions, participants 1, 2, 4, and 5 all showed a small relationship with participants 3 and 4 showing a moderate relationship.

Maintenance

To answer our last research question (do caregivers maintain the use of these strategies post-intervention?) we will analyze using the visual analysis. The visual analysis indicates different results for each Participant. When looking at Participant 2, the parent maintained using the “Qué” strategy. However, the remaining strategies used in training were not maintained. Additionally, it is important to note that the “Qué” strategy was already being used frequently by the parent prior to training. Furthermore, Participant 3 had high success in maintaining strategies during the maintenance stage. All strategies were used at least twice in the maintenance stage which is a significant increase from baseline for this Participant. When analyzing Participant 5, it is clear that the “Qué,” “Quién” and “Dónde” strategies were maintained. However, the “Cuándo” and “Por Qué” were never used; thus, not maintained. Finally, when looking at Participant 6, it is important to note that there was a lack of data for sessions 14-20. However, sessions 21-28 prove to have strategies maintained. Use of “Qué,” “Quién” and “Dónde” were maintained with slight use of “Por qué.” “Cuándo” was not used by Participant 6 in maintenance. Unfortunately, for Participants 1 and 4, there is no maintenance data.

Chapter IV

Discussion

Results

The results of this data show that the training was successful in increasing the overall use of the Dialogic Reading questioning strategies with the participants. When analyzing the individual type of question instead of the strategy as a whole, there were interesting findings. The “Qué” questioning strategy seemed to be most successful while the “Por qué” and “Cuándo” strategies appeared to be the least successful based off usage in the training and maintenance stages. For most participants, they were able to maintain the use of what they learned while in the training stage. Additionally, it seems like the participants use a wider variety of questions after being trained with the dialogic reading strategies.

These findings show that the parents in the study were most likely to default to a “Qué” or “What” question when reading to their child while trying to use Dialogic Reading strategies. In regard to clinical implications, it is important as a clinician to be specific in what type of questions you are covering with clients. It would be beneficial to provide a variety of training in parents and emphasizing the importance of using different types of questions to further strengthen their child’s vocabulary. It could be possible that parents of these children who are at risk of DLD feel like it is more beneficial to choose a questioning strategy that takes less time and energy for their child to answer. A “Por qué” or “Cuándo” question has the potential to use more cognitive thinking abilities when answering since they typically require longer answer responses. It could be possible that in an attempt to help their child, parent’s think that picking a Qué or Por qué question would be more helpful.

Limitation of the Study and Future Research

A limitation to this study is that the training might have been impacted because the children being read to were at risk of Developmental Language Disorder. This could greatly change the child and parent interactions. This means that we cannot assume that all parents being taught Dialogic Reading Strategies will have similar results or ask the same type of questions. Additionally, there is some missing data for Participants 4 and 6 which could impact results. Future research should consider these limitations. Also, future research that includes the app developed here could potentially use better explanations for the “Por qué” and “Cuándo” question strategies as well as emphasize the importance of variety when asking your children questions while reading.

Clinical Implications and Conclusions

The clinical implications of the research support the idea that the parental training app created in this research study can teach bilingual mothers how to enrich their children’s learning outcomes. The parental training app can help bridge the gap between dual language learners at risk for Developmental Language Disorder and the typical elementary-aged child. Additionally, can be a tool used to help communities that need resources to help their dual language learner students. Ideally, Speech Language Pathologists would be able to give this app to the parents of their clients that fit this description. The parental training app could be a helpful tool within the therapy process because the parent would be able to then use the app and learn how to read to their child. The parent would be able to reinforce what the child is learning in therapy as home practice; thus, making a more consistent learning routine for the child.

In conclusion, this research proves that the Spanish-speaking mothers in this study have the ability to learn from the Teach-Model-Coach-Review. These mothers were able to learn

language enrichment strategies that help expand their children's vocabulary through dialogic reading strategies.

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Table 1

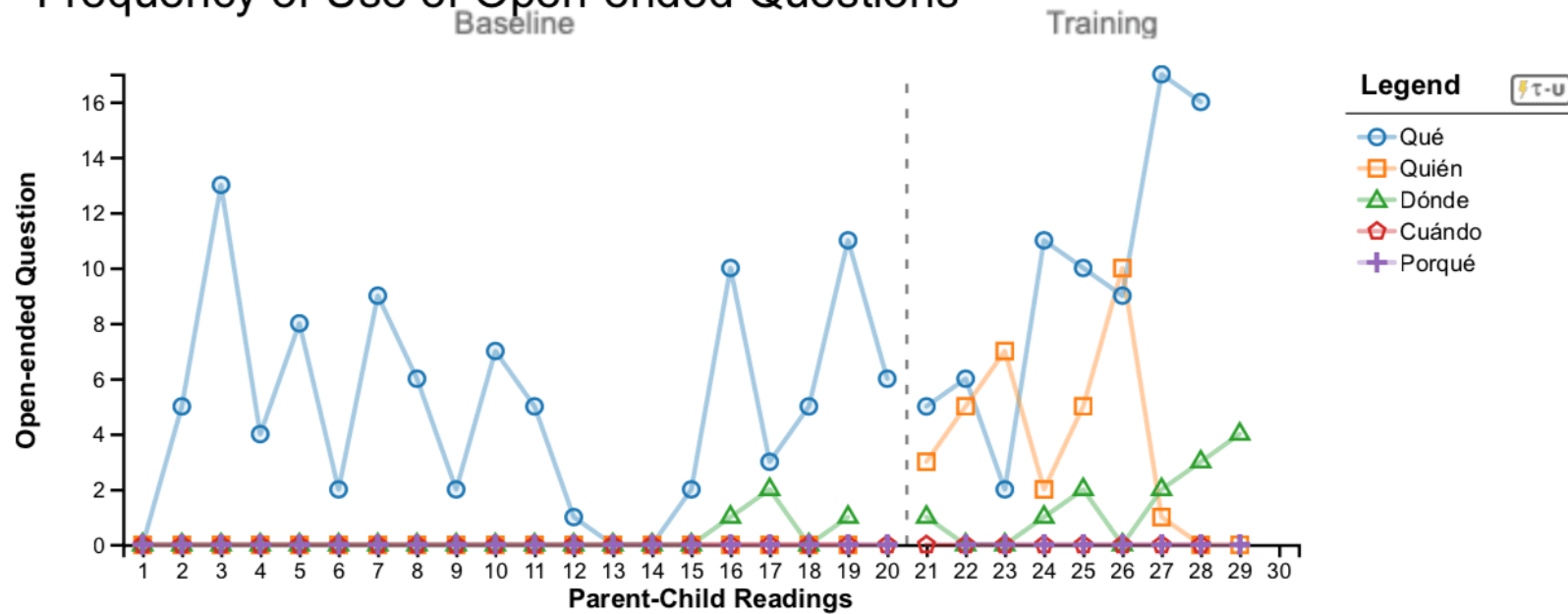
Baseline-corrected Tau effect size estimate

Type of Question	Effect size estimate	Standard error	95% CI:
Participant 1			
Qué (What)	0.52	0.21	[0.04, 0.79]
Quién (Who)	0.78	0.15	[0.35, 0.93]
Dónde (Where)	0.56	0.20	[0.09, 0.81]
Cuándo (When)	0.00	0.09	[-0.43, 0.43]
Porqué (Why)	0.00	0.09	[-0.43, 0.43]
Participant 2			
Qué (What)	0.30	0.22	[-0.13, 0.63]
Quién (Who)	0.31	0.14	[-0.12, 0.64]
Dónde (Where)	0.15	0.22	[-0.27, 0.51]
Cuándo (When)	0.31	0.14	[-0.12, 0.64]
Porqué (Why)	0.12	0.11	[-0.29, 0.50]
Participant 3			
Qué (What)	-0.90	0.09	[-0.99, -0.31]
Quién (Who)	0.59	0.20	[-0.03, 0.87]
Dónde (Where)	0.75	0.11	[0.13, 0.94]
Cuándo (When)	0.50	0.13	[-0.12, 0.82]
Porqué (Why)	0.58	0.13	[-0.04, 0.87]
Participant 4			
Qué (What)	-0.38	0.18	[-0.72, 0.12]
Quién (Who)	-0.07	0.12	[-0.50, 0.39]
Dónde (Where)	0.41	0.22	[-0.09, 0.73]
Cuándo (When)	0.12	0.16	[-0.34, 0.54]
Porqué (Why)	0.18	0.20	[-0.30, 0.58]
Participant 5			
Qué (What)	1.00	0.01	[1.00, 1.00]
Quién (Who)	0.64	0.14	[0.17, 0.86]
Dónde (Where)	0.61	0.21	[0.13, 0.84]
Cuándo (When)	0.00	0.09	[-0.42, 0.42]
Porqué (Why)	0.00	0.09	[-0.42, 0.42]
Participant 6			
Qué (What)	0.82	0.11	[0.19, 0.97]
Quién (Who)	0.76	0.13	[0.13, 0.95]
Dónde (Where)	0.59	0.15	[-0.05, 0.87]
Cuándo (When)	0.00	0.14	[-0.53, 0.53]
Porqué (Why)	0.41	0.17	[-0.21, 0.78]

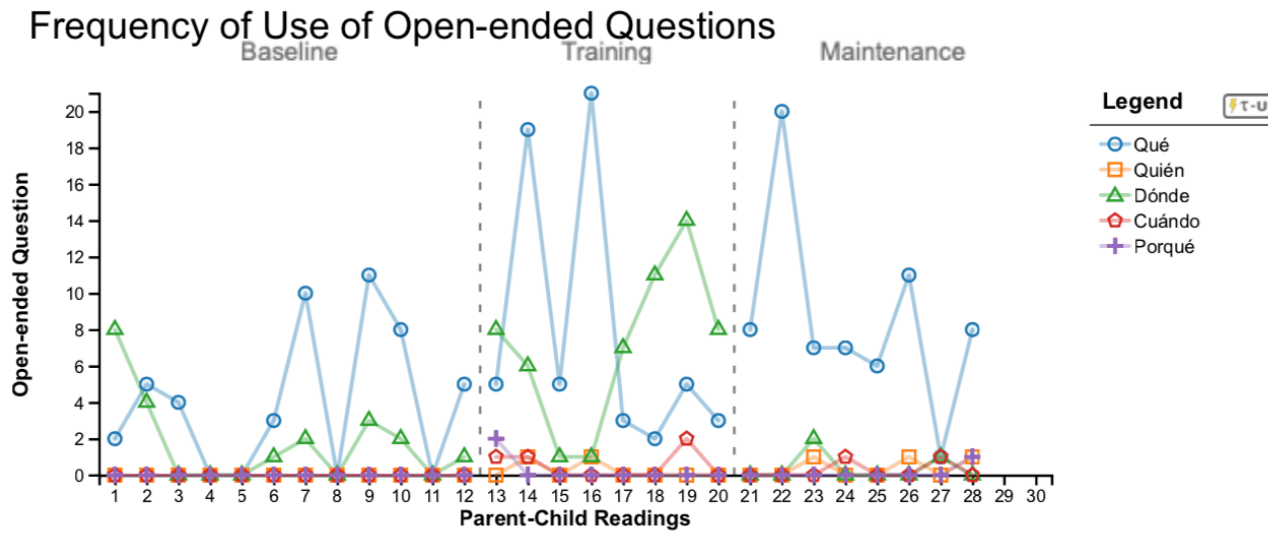
Figures

Participant 1: Probe sessions during baseline, questioning training, and maintenance conditions.

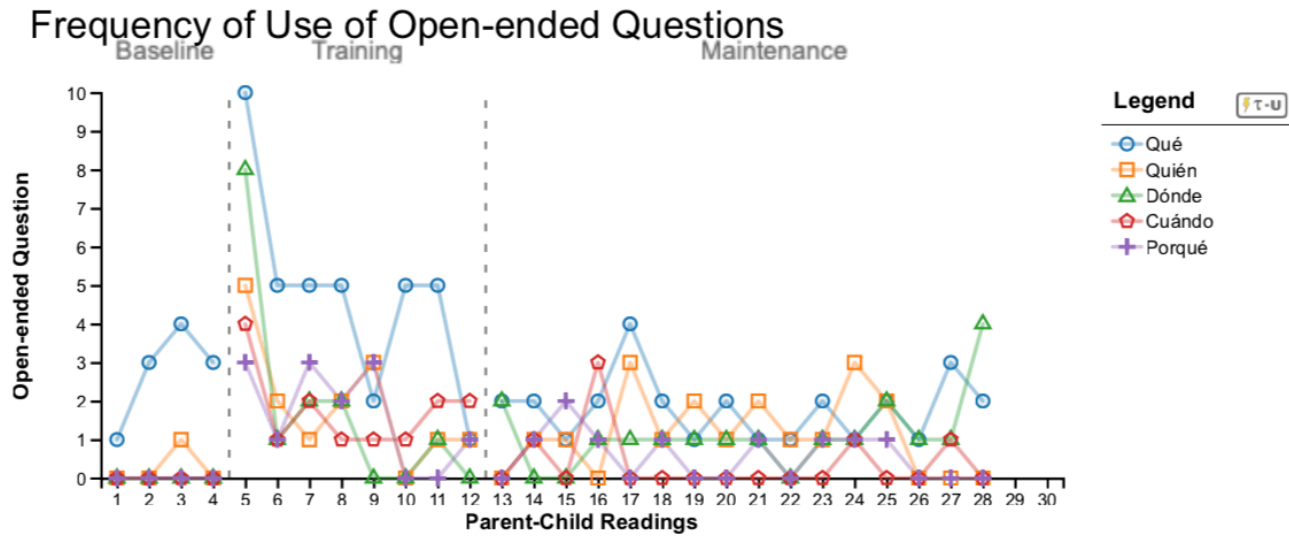
Frequency of Use of Open-ended Questions



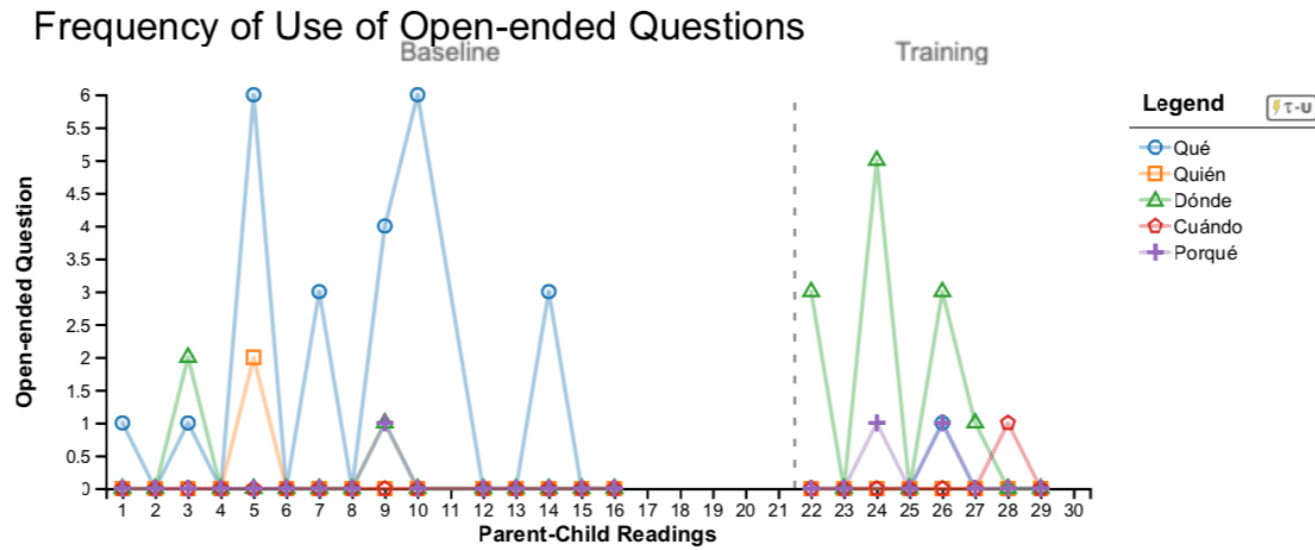
Participant 2: Probe sessions during baseline, questioning training, and maintenance conditions.



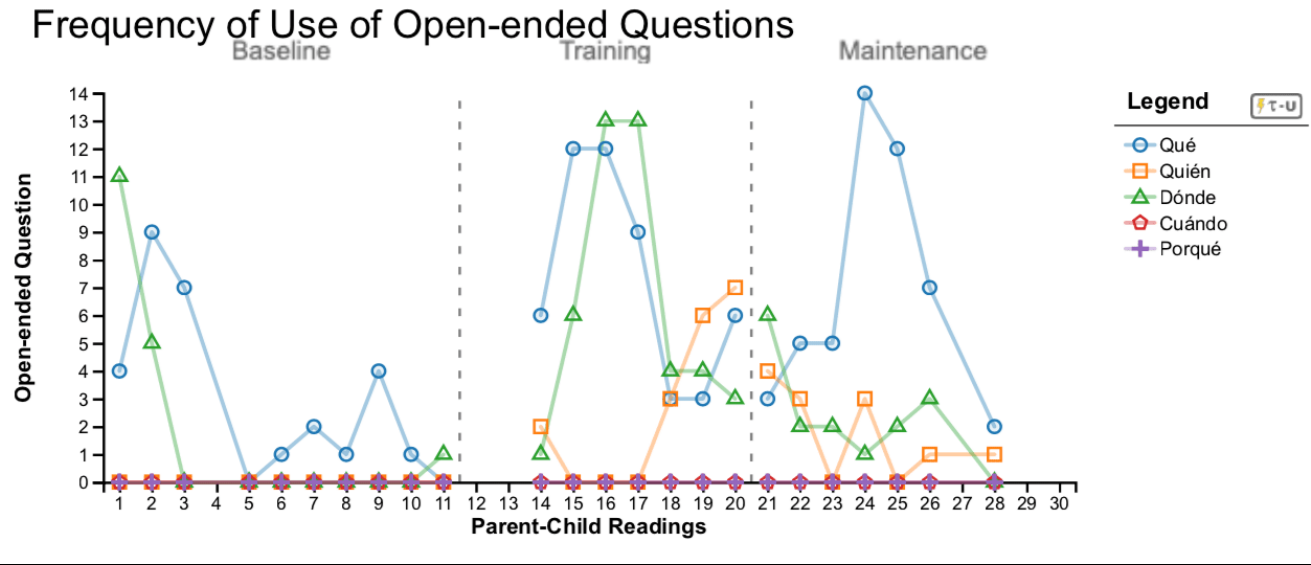
Participant 3: Probe sessions during baseline, questioning training, and maintenance conditions.



Participant 4: Probe sessions during baseline, questioning training, and maintenance conditions.



Participant 5: Probe sessions during baseline, questioning training, and maintenance conditions.



Participant 6: Probe sessions during baseline, questioning training, and maintenance conditions.

